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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/611,815	LE ET AL.	
	Examiner	Art Unit	
	Qing Chen	2191	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 January 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *2-16,18-25 and 27-52* is/are pending in the application.

4a) Of the above claim(s) *28-52* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *2-16, 18-25, and 27* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This Office action is in response to the amendment filed on January 3, 2008.

2. **Claims 2-16, 18-25, and 27-52** are pending.

3. **Claims 28-52** are withdrawn from consideration.

4. **Claims 2-16, 18-25, and 27** have been amended.

5. **Claims 1, 17, and 26** have been cancelled.

6. **Claims 28-52** have been added.

7. The objections to Claims 1-27 are withdrawn in view of Applicant's amendments to the claims or cancellation of the claims. However, Applicant's amendments to the claims fail to address the objection to Claim 5 due to inconsistent claim language. Accordingly, this objection is maintained and further explained below.

8. The 35 U.S.C. § 112, second paragraph, rejections of Claims 3-16 and 18-27 are withdrawn in view of Applicant's amendments to the claims or cancellation of the claims. However, Applicant's amendments to the claims fail to address the rejections to Claims 16 and 27 due to insufficient antecedent bases. Accordingly, these rejections are maintained and further explained below.

Response to Amendment

Election/Restrictions

9. Newly submitted Claims 28-52 are directed to an invention that is independent or distinct from the invention originally claimed for the following reasons:

I. Claims 2-16, 18-25, and 27, drawn to mounting a disk image on a computer, classified in class 717, subclass 174.

II. Claims 28-52, drawn to a universal computer management system, classified in class 707, subclass 10.

Inventions I and II are related as combination and subcombination, respectively. Inventions in this relationship are distinct if it can be shown that (1) the combination as claimed does not require the particulars of the subcombination as claimed for patentability, and (2) that the subcombination has utility by itself or in other combinations (MPEP § 806.05(c)). In the instant case, the combination (I) as claimed does not require the particulars of the subcombination (II) as claimed because the combination (I) does not rely upon the specific details of the subcombination (II) for patentability, such as, *inter alia*, the specific limitations of maintaining a registration database and updating the registration database. The subcombination (II) has separate utility such as maintaining the registration database for distributing software programs to registered computers.

Since Applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, Claims 28-52 are withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

Claim Objections

10. **Claims 5, 6, 18, 20, and 27** are objected to because of the following informalities:

- **Claim 5** recites the limitation "the sector-based I/O requests." Applicant is advised to change this limitation to read "the intercepted sector-based I/O requests" for the purpose of keeping the claim language consistent throughout the claims.
- **Claim 6** depends on Claim 5 and, therefore, suffers the same deficiency as Claim 5.
- **Claims 18 and 20** contain a typographical error: The word "and" should be added after the first limitation.
- **Claim 27** contains a typographical error: A colon (:) should be added after the "an imaging client installed in the memory of the first computer …" limitation.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

11. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

12. **Claims 16, 21-25, and 27** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 16 recites the limitation "the imaging client." There is insufficient antecedent basis for this limitation in the claim. In the interest of compact prosecution, the Examiner subsequently interprets this limitation as reading "the imaging client program" for the purpose of further examination.

Claim 21 recites the limitation "the files." There is insufficient antecedent basis for this limitation in the claim. In the interest of compact prosecution, the Examiner subsequently interprets this limitation as reading "files" for the purpose of further examination.

Claims 22-25 depend on Claim 21 and, therefore, suffer the same deficiency as Claim 21.

Claim 27 recites the limitation "the file system." There is insufficient antecedent basis for this limitation in the claim. In the interest of compact prosecution, the Examiner subsequently interprets this limitation as reading "a file system" for the purpose of further examination.

Claim Rejections - 35 USC § 102

13. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

14. **Claims 2-5 and 18-20** are rejected under 35 U.S.C. 102(e) as being anticipated by **US 6,477,624 (hereinafter "Kedem")**.

As per **Claim 3**, Kedem discloses:

- mounting a simulated source disk in the second computer so that the simulated source disk is accessible by the operating system as a local disk *(see Column 8: 63-67 to Column 9: 1, "The mini-booter displays the list of available master data images and prompts the user to select one. The mini-booter communicates the selection to LDIM 202 and then either reboots the computer or resets the BIOS's disk geometry table to the geometry of the selected master data image.")*; and

- configuring the simulated source disk as a proxy for the source disk by intercepting sector-based I/O requests directed to the simulated source disk and retrieving source disk data from the source disk according to the intercepted sector-based I/O requests *(see Column 3: 62-67 to Column 4: 1-3, "The purpose of the LDIM is to imitate the LPSD. That is, the LDIM, from the computer's perspective, appears exactly like the LPSD. More specifically, the LDIM functions to intercept and process requests that are intended to be received by the LPSD, which may not be in fact installed in the computer."; Column 9: 9-15, "... LDIM 202 functions to intercept requests (for example, read/write requests) that are intended to be received by storage device 110. After a master data image is selected, upon intercepting a read request, LDIM 202 is programmed to determine whether the cached data image or the selected master data image has the most up to date version of the requested data." and 28-32, "If LDIM 202 determines that the cached data image has the most up to date version of the requested data, then LDIM 202 retrieves the requested data from storage device 110 and passes the data back to the component or device from which it received the request."; Column 13: 66 and 67 to Column 14: 1 and 2, "Another approach is to add the interception and implementation of the LDIM onto the physical persistent*

storage device 110. This functionality would be added before the device's controller (not shown) handles requests.").

As per **Claim 2**, the rejection of **Claim 3** is incorporated; and Kedem further discloses:

- populating a destination image with extracted contents of the source disk in which the destination image has files, attributes, and structural relationships between files identical to files, attributes, and structural relationships between files of the source disk *(see Column 1: 29-38, "The contents of the hard disk (also referred to as the hard disk's "disk image" or "data image") define the user's personalized environment: ..." and 53-62, "When the persistent storage device is a hard disk, the persistent storage device data image will frequently be called a "disk image."")*.

As per **Claim 4**, the rejection of **Claim 3** is incorporated; and Kedem further discloses:

- forwarding the intercepted sector-based I/O requests to the first computer over a network *(see Column 10: 19-20, "In this situation, LDIM 202 merely forwards all read/write requests to the appropriate RDIM 204.")*.

As per **Claim 5**, the rejection of **Claim 4** is incorporated; and Kedem further discloses:

- loading an imaging client program in the memory of the first computer, the imaging client program not being resident on the source disk *(see Column 9: 65-67, "RDIM 204 preferably includes image manipulation tools. The image manipulation tools allow system administrators to manipulate master data images stored on RPSD 206.")*; and

- passing the intercepted sector-based I/O requests to the imaging client program, the imaging client program directing the intercepted sector-based I/O requests to the source disk *(see Column 10: 26-29, "It should also be noted that the propagation of write requests from LDIM 202 to RDIM 204 for the purpose of updating the master data image can be timed to best utilize the network bandwidth.")*.

As per **Claim 18**, Kedem discloses:

- a first computer having the source disk *(see Column 8: 6-7, "The DIMS is 110 a client/server system, and thus includes a client 202 and a server 204.")*; and

- a second computer having a memory with an operating system and an imaging server residing therein, the imaging server including computer executable instructions having code to create a simulated source disk that is a representation of information stored on the source disk and is accessed by the operating system as a local disk; and code to mount the simulated source disk in the second computer, with said memory including file system drivers to detect a file system of the simulated source disk and a network loopback driver intercepting sector-based I/O requests directed to the simulated source disk and retrieving source disk data from the source disk according to intercepted sector-based I/O requests intercepted by the network loopback driver *(see Column 1: 29-38, "The contents of the hard disk (also referred to as the hard disk's "disk image" or "data image") define the user's personalized environment: ..." and 53-62, "When the persistent storage device is a hard disk, the persistent storage device data image will frequently be called a "disk image.""; Column 3: 62-67 to Column 4: 1-3, "The purpose of the LDIM is to imitate the LPSD. That is, the LDIM, from the computer's perspective, appears*

exactly like the LPSD. More specifically, the LDIM functions to intercept and process requests that are intended to be received by the LPSD, which may not be in fact installed in the computer."; Column 6: 17-19, "... the operating system directs the request to an appropriate device driver for the physical device to which the request was made."; Column 8: 6-7, "The DIMS is 110 a client/server system, and thus includes a client 202 and a server 204." and 43-44, "... LDIM 202 includes a "mini-booter" software program (not shown)." and 47-48, "This is done by emulating a disk with the mini-booter installed as a loader." and 63-67 to Column 9: 1, "The mini-booter displays the list of available master data images and prompts the user to select one. The mini-booter communicates the selection to LDIM 202 and then either reboots the computer or resets the BIOS's disk geometry table to the geometry of the selected master data image."; Column 9: 9-15, "... LDIM 202 functions to intercept requests (for example, read/write requests) that are intended to be received by storage device 110. After a master data image is selected, upon intercepting a read request, LDIM 202 is programmed to determine whether the cached data image or the selected master data image has the most up to date version of the requested data." and 28-32, "If LDIM 202 determines that the cached data image has the most up to date version of the requested data, then LDIM 202 retrieves the requested data from storage device 110 and passes the data back to the component or device from which it received the request."; Column 13: 66 and 67 to Column 14: 1 and 2, "Another approach is to add the interception and implementation of the LDIM onto the physical persistent storage device 110. This functionality would be added before the device's controller (not shown) handles requests.").

As per **Claim 19**, the rejection of **Claim 18** is incorporated; and Kedem further discloses:

- a network adapter, residing in said memory, to forward the intercepted sector-based I/O requests to the first computer *(see Column 10: 19-20, "In this situation, LDIM 202 merely forwards all read/write requests to the appropriate RDIM 204." and 49-51, "LDIM card 308 is equipped with an embedded processor, logic circuits, and memory 310 for enabling LDIM 202 to perform its functions.")*.

As per **Claim 20**, the rejection of **Claim 19** is incorporated; and Kedem further discloses:

- a first computer memory within the first computer *(see Figure 1: 110)*; and
- an imaging client installed in the first computer memory *(see Column 9: 65-67, "RDIM 204 preferably includes image manipulation tools. The image manipulation tools allow system administrators to manipulate master data images stored on RPSD 206.")*, said imaging client comprising computer-executable instructions that include code to receive any source disk I/O requests issued from the second computer to the first computer, code to direct the intercepted sector-based I/O requests to the source disk, and code to pass the retrieved source disk data to the second computer in response to the source disk I/O requests *(see Column 9: 9-15, "... LDIM 202 functions to intercept requests (for example, read/write requests) that are intended to be received by storage device 110. After a master data image is selected, upon intercepting a read request, LDIM 202 is programmed to determine whether the cached data image or the selected master data image has the most up to date version of the requested data." and 28-32, "If LDIM 202 determines that the cached data image has the most up to date version of the requested data, then LDIM 202 retrieves the requested data from storage device 110 and passes the data back to the component or device from which it received the request."; Column 10: 26-29, "It should also*

be noted that the propagation of write requests from LDIM 202 to RDIM 204 for the purpose of updating the master data image can be timed to best utilize the network bandwidth.").

Claim Rejections - 35 USC § 103

15. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

16. **Claim 6** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Kedem** in view of **US 7,000,231 (hereinafter "Gold")**.

As per **Claim 6**, the rejection of **Claim 5** is incorporated; however, Kedem does not disclose:

- loading a secondary operating system in the memory of the first computer, said secondary operating system not being present on the source disk and mediating I/O requests between an imaging client program and the source disk.

Gold discloses:

- loading a secondary operating system in the memory of the first computer, said secondary operating system not being present on the source disk and mediating I/O requests between an imaging client program and the source disk *(see Column 3: 23-28, "A utility can then be used to reset a system identification of the computer entity, before switching to a secondary*

operating system to complete a build process." and 38-40, "A build process under control of a secondary "emergency" operating system can copy a fully installed primary operating system onto an operating system back-up volume.").

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Gold into the teaching of Kedem to include loading a secondary operating system in the memory of the first computer, said secondary operating system not being present on the source disk and mediating I/O requests between an imaging client program and the source disk. The modification would be obvious because one of ordinary skill in the art would be motivated to guarantee creation of an uncorrupted complete copy of the primary operating system *(see Gold – Column 3: 41-43).*

17. **Claims 7, 8, 12, 13, 15, 16, 21-23, and 27** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Kedem** in view of **US 5,991,542 (hereinafter "Han")**.

As per **Claim 7**, the rejection of **Claim 3** is incorporated; and Kedem further discloses:

- mounting the destination image in an uninitialized state in the second computer as a simulated destination disk *(see Column 8: 63-67 to Column 9: 1, "The mini-booter displays the list of available master data images and prompts the user to select one. The mini-booter communicates the selection to LDIM 202 and then either reboots the computer or resets the BIOS's disk geometry table to the geometry of the selected master data image.")*;

- intercepting sector-based I/O requests directed to the simulated destination disk and directing the contents of the intercepted sector-based I/O requests to the destination image *(see*

Column 9: 9-15, "... LDIM 202 functions to intercept requests (for example, read/write requests) that are intended to be received by storage device 110. After a master data image is selected, upon intercepting a read request, LDIM 202 is programmed to determine whether the cached data image or the selected master data image has the most up to date version of the requested data."); and

- copying files of at least one file system of the simulated source disk to the corresponding file system of the simulated destination disk *(see Column 9: 48-51, "It is envisioned that a user who uses the DIMS would initially copy the data image stored on storage device 110 onto RPSD 206 and then always select that image as the master data image.")*.

However, Kedem does not disclose:

- retrieving partition and file system layout information from the source disk; and

- formatting the simulated destination image to have the same partitioning and file system(s) as the simulated source disk and thus of the source disk.

Han discloses:

- retrieving partition and file system layout information from the source disk *(see Column 4: 41-44, "A larger storage device, such as a hard disk or a file server, can be divided into many different volumes, or partitions, each of which can be formatted in a different manner.")*; and

- formatting the simulated destination image to have the same partitioning and file system as the simulated source disk and thus of the source disk *(see Column 4: 64-67, "This information is initially created when the volume is initialized, or formatted, and modified thereafter whenever the file management system writes information to the volume.")*.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Han into the teaching of Kedem to include retrieving partition and file system layout information from the source disk; and formatting the simulated destination image to have the same partitioning and file system as the simulated source disk and thus of the source disk. The modification would be obvious because one of ordinary skill in the art would be motivated to create a disk image that has properties of the physical storage device *(see Han – Column 3: 30-34)*.

As per **Claim 8**, the rejection of **Claim 7** is incorporated; and Kedem further discloses:

- converting the intercepted sector-based I/O requests to the simulated destination disk into sector accesses within the destination image *(see Column 9: 36-39, "Upon receiving the read request, RDIM 204 locates and reads the requested data from the selected master data image stored on RPSD 206 and then transmits the data back to LDIM 202.")*.

As per **Claim 12**, the rejection of **Claim 7** is incorporated; and Kedem further discloses:

- in which the source disk is a source virtual disk *(see Column 1: 53-62, "When the persistent storage device is a hard disk, the persistent storage device data image will frequently be called a "disk image."")*.

As per **Claim 13**, the rejection of **Claim 12** is incorporated; and Kedem further discloses:

- in which the destination disk is a physical disk *(see Figure 1: 110)*.

As per **Claim 15**, the rejection of **Claim 7** is incorporated; and Kedem further discloses:

- in which the first computer is the same as the second computer *(see Column 8: 6-7, "The DIMS is 110 a client/server system, and thus includes a client 202 and a server 204.")*.

As per **Claim 16**, Kedem discloses:

- in a second computer that includes an operating system that has file system software that detects a file system of disks mounted in the second computer, while the source disk is in an unmodified, unprepared state, extracting the contents of the source disk, defining extracted contents, and populating a destination image with the extracted contents of the source disk such that the destination image may have a different sector-by-sector content than the source disk but a destination file system logically equivalent to the at least one source file system, with identical files, attributes, and structural relationships between files as the source disk *(see Column 1: 29-38, "The contents of the hard disk (also referred to as the hard disk's "disk image" or "data image") define the user's personalized environment: ..." and 53-62, "When the persistent storage device is a hard disk, the persistent storage device data image will frequently be called a "disk image.""; Column 8: 6-7, "The DIMS is 110 a client/server system, and thus includes a client 202 and a server 204.")*;

- mounting a simulated source disk in the second computer so that the simulated source disk is accessible by the operating system as a local disk *(see Column 8: 63-67 to Column 9: 1, "The mini-booter displays the list of available master data images and prompts the user to select one. The mini-booter communicates the selection to LDIM 202 and then either reboots the*

computer or resets the BIOS's disk geometry table to the geometry of the selected master data image.");

- configuring the simulated source disk as a proxy for the source disk by intercepting sector-based I/O requests directed to the simulated source disk and retrieving source disk data from the source disk according to the intercepted sector-based I/O requests *(see Column 9: 9-15, "... LDIM 202 functions to intercept requests (for example, read/write requests) that are intended to be received by storage device 110. After a master data image is selected, upon intercepting a read request, LDIM 202 is programmed to determine whether the cached data image or the selected master data image has the most up to date version of the requested data." and 28-32, "If LDIM 202 determines that the cached data image has the most up to date version of the requested data, then LDIM 202 retrieves the requested data from storage device 110 and passes the data back to the component or device from which it received the request.")*;

- forwarding the intercepted sector-based I/O requests to the first computer *(see Column 10: 19-20, "In this situation, LDIM 202 merely forwards all read/write requests to the appropriate RDIM 204.")*;

- loading an imaging client program into a memory of the first computer *(see Column 9: 65-67, "RDIM 204 preferably includes image manipulation tools. The image manipulation tools allow system administrators to manipulate master data images stored on RPSD 206.")*;

- passing the intercepted sector-based I/O requests to the imaging client program, the imaging client program directing the intercepted sector-based I/O requests to the source disk *(see Column 10: 26-29, "It should also be noted that the propagation of write requests from LDIM*

202 to RDIM 204 for the purpose of updating the master data image can be timed to best utilize the network bandwidth.");

- mediating, by the operating system, sector-based I/O requests between the imaging client program and the source disk *(see Column 10: 19-20, "In this situation, LDIM 202 merely forwards all read/write requests to the appropriate RDIM 204.")*;

- mounting the destination image in an uninitialized state in the second computer as a simulated destination disk *(see Column 8: 63-67 to Column 9: 1, "The mini-booter displays the list of available master data images and prompts the user to select one. The mini-booter communicates the selection to LDIM 202 and then either reboots the computer or resets the BIOS's disk geometry table to the geometry of the selected master data image.")*;

- intercepting sector-based I/O requests directed to the simulated destination disk and directing results of the intercepted sector-based I/O requests to the destination image *(see Column 9: 9-15, "... LDIM 202 functions to intercept requests (for example, read/write requests) that are intended to be received by storage device 110. After a master data image is selected, upon intercepting a read request, LDIM 202 is programmed to determine whether the cached data image or the selected master data image has the most up to date version of the requested data.")*;

- converting the intercepted sector-based I/O requests to the simulated destination disk into sector accesses within the destination image *(see Column 9: 36-39, "Upon receiving the read request, RDIM 204 locates and reads the requested data from the selected master data image stored on RPSD 206 and then transmits the data back to LDIM 202.")*; and

- copying files of at least one file system of the simulated source disk to the corresponding file system of the simulated destination disk *(see Column 9: 48-51, "It is envisioned that a user who uses the DIMS would initially copy the data image stored on storage device 110 onto RPSD 206 and then always select that image as the master data image.")*.

However, Kedem does not disclose:

- retrieving partition and file system layout information from the source disk; and

- formatting the simulated destination image to have the same partitioning and file system(s) as the simulated source disk and thus of the source disk.

Han discloses:

- retrieving partition and file system layout information from the source disk *(see Column 4: 41-44, "A larger storage device, such as a hard disk or a file server, can be divided into many different volumes, or partitions, each of which can be formatted in a different manner.")*; and

- formatting the simulated destination image to have the same partitioning and file system(s) as the simulated source disk and thus of the source disk *(see Column 4: 64-67, "This information is initially created when the volume is initialized, or formatted, and modified thereafter whenever the file management system writes information to the volume.")*.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Han into the teaching of Kedem to include retrieving partition and file system layout information from the source disk; and formatting the simulated destination image to have the same partitioning and file system(s) as the simulated source disk and thus of the source disk. The modification would be obvious because

one of ordinary skill in the art would be motivated to create a disk image that has properties of the physical storage device *(see Han – Column 3: 30-34)*.

As per **Claim 21**, the rejection of **Claim 18** is incorporated; and Kedem further discloses:

- wherein the imaging server further includes code to generate a simulated destination disk in response to the second computer mounting the destination image, with said memory further including a local loopback driver, a local adapter and a formatting module, with the local loopback driver intercepting sector-based I/O requests directed to the simulated destination disk and the local adapter comprising code to convert the intercepted sector-based I/O requests to the simulated destination disk into sector accesses within the destination image, the imaging server having code to copy files of at least one file system of the simulated source disk to the corresponding file system of the simulated destination disk *(see Column 8: 63-67 to Column 9: 1, "The mini-booter displays the list of available master data images and prompts the user to select one. The mini-booter communicates the selection to LDIM 202 and then either reboots the computer or resets the BIOS's disk geometry table to the geometry of the selected master data image."; Column 9: 9-15, "... LDIM 202 functions to intercept requests (for example, read/write requests) that are intended to be received by storage device 110. After a master data image is selected, upon intercepting a read request, LDIM 202 is programmed to determine whether the cached data image or the selected master data image has the most up to date version of the requested data." and 36-39, "Upon receiving the read request, RDIM 204 locates and reads the requested data from the selected master data image stored on RPSD 206 and then transmits the data back to LDIM 202." and 48-51, "It is envisioned that a user who uses the DIMS would*

initially copy the data image stored on storage device 110 onto RPSD 206 and then always select that image as the master data image.").

However, Kedem does not disclose:

- the local loopback driver retrieving partition and file system layout information from the source disk; and

- the formatting module comprising code to format the destination image to have the same partitioning and file system(s) as the simulated source disk and thus of the source disk.

Han discloses:

- the local loopback driver retrieving partition and file system layout information from the source disk *(see Column 4: 41-44, "A larger storage device, such as a hard disk or a file server, can be divided into many different volumes, or partitions, each of which can be formatted in a different manner.")*; and

- the formatting module comprising code to format the destination image to have the same partitioning and file system(s) as the simulated source disk and thus of the source disk *(see Column 4: 64-67, "This information is initially created when the volume is initialized, or formatted, and modified thereafter whenever the file management system writes information to the volume.")*.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Han into the teaching of Kedem to include the local loopback driver retrieving partition and file system layout information from the source disk; and the formatting module comprising code to format the destination image to have the same partitioning and file system(s) as the simulated source disk and thus of the source disk. The

modification would be obvious because one of ordinary skill in the art would be motivated to create a disk image that has properties of the physical storage device *(see Han – Column 3: 30-34)*.

As per **Claim 22**, the rejection of **Claim 21** is incorporated; and Kedem further discloses:

- in which the source disk is a virtual disk *(see Column 1: 53-62, "When the persistent storage device is a hard disk, the persistent storage device data image will frequently be called a "disk image."")*.

As per **Claim 23**, the rejection of **Claim 22** is incorporated; and Kedem further discloses:

- in which the destination disk is a physical disk *(see Figure 1: 110)*.

As per **Claim 27**, Kedem discloses:

- a second computer *(see Column 8: 6-7, "The DIMS is 110 a client/server system, and thus includes a client 202 and a server 204.")*;

- a server operating system that resides in the second computer *(see Column 8: 6-7, "The DIMS is 110 a client/server system, and thus includes a client 202 and a server 204.")*;

- file system drivers within the server operating system automatically detecting at least one file system of disks mounted in the second computer *(see Column 6: 17-19, "... the operating system directs the request to an appropriate device driver for the physical device to which the request was made.")*;

- an imaging server running within the second computer *(see Column 8: 43-44, "... LDIM 202 includes a "mini-booter" software program (not shown).")* and comprising computer-executable instructions:

- for extracting the contents of the source disk, defining extracted contents, and populating a destination image with the extracted contents of the source disk such that the destination image may have a different sector-by-sector content than the source disk but a destination file system logically equivalent to the at least one source file system *(see Column 1: 29-38, "The contents of the hard disk (also referred to as the hard disk's "disk image" or "data image") define the user's personalized environment: ..." and 53-62, "When the persistent storage device is a hard disk, the persistent storage device data image will frequently be called a "disk image."")*;

- for creating a simulated source disk corresponding to the source disk *(see Column 8: 47-48, "This is done by emulating a disk with the mini-booter installed as a loader.")*;

- while the source disk is in an unmodified, unprepared state, for mounting the simulated source disk in the second computer, the file system drivers thereby automatically detecting a file system of the simulated source disk and therefore of the source disk and exposing a file system to software running on the second computer *(see Column 8: 63-67 to Column 9: 1, "The mini-booter displays the list of available master data images and prompts the user to select one. The mini-booter communicates the selection to LDIM 202 and then either reboots the computer or resets the BIOS's disk geometry table to the geometry of the selected master data image.")*;

- a network loopback driver intercepting sector-based I/O requests directed to the simulated source disk *(see Column 9: 9-15, "... LDIM 202 functions to intercept requests (for example, read/write requests) that are intended to be received by storage device 110. After a master data image is selected, upon intercepting a read request, LDIM 202 is programmed to determine whether the cached data image or the selected master data image has the most up to date version of the requested data.")*;

- a network adapter forwarding the intercepted sector-based I/O requests to the first computer *(see Column 10: 19-20, "In this situation, LDIM 202 merely forwards all read/write requests to the appropriate RDIM 204.")*;

- an imaging client installed in the memory of the first computer *(see Column 9: 65-67, "RDIM 204 preferably includes image manipulation tools. The image manipulation tools allow system administrators to manipulate master data images stored on RPSD 206.")*, said imaging client comprising computer-executable instructions:

- for receiving any source disk I/O requests issued from the second computer to the first computer *(see Column 9: 9-15, "... LDIM 202 functions to intercept requests (for example, read/write requests) that are intended to be received by storage device 110.")*,

- for directing the intercepted sector-based I/O requests to the source disk *(see Column 9: 9-15, "After a master data image is selected, upon intercepting a read request, LDIM 202 is programmed to determine whether the cached data image or the selected master data image has the most up to date version of the requested data.")*, and

- for passing to the second computer source disk data retrieved in response to the source disk I/O requests *(see Column 9: 28-32, "If LDIM 202 determines that the cached data*

image has the most up to date version of the requested data, then LDIM 202 retrieves the requested data from storage device 110 and passes the data back to the component or device from which it received the request."; Column 10: 26-29, "It should also be noted that the propagation of write requests from LDIM 202 to RDIM 204 for the purpose of updating the master data image can be timed to best utilize the network bandwidth.");

- a simulated destination disk generated by mounting the destination image in an uninitialized state in the second computer *(see Column 8: 63-67 to Column 9: 1, "The mini-booter displays the list of available master data images and prompts the user to select one. The mini-booter communicates the selection to LDIM 202 and then either reboots the computer or resets the BIOS's disk geometry table to the geometry of the selected master data image.")*;

- a local loopback driver intercepting sector-based I/O requests directed to the simulated destination disk *(see Column 9: 9-15, "... LDIM 202 functions to intercept requests (for example, read/write requests) that are intended to be received by storage device 110. After a master data image is selected, upon intercepting a read request, LDIM 202 is programmed to determine whether the cached data image or the selected master data image has the most up to date version of the requested data.")*;

- a local adapter comprising computer-executable instructions for converting the intercepted sector-based I/O requests to the simulated destination disk into sector accesses within the destination image *(see Column 9: 36-39, "Upon receiving the read request, RDIM 204 locates and reads the requested data from the selected master data image stored on RPSD 206 and then transmits the data back to LDIM 202.")*; and

- the imaging server further comprising computer-executable instructions for copying files of at least one file system of the simulated source disk to the corresponding file system of the simulated destination disk *(see Column 9: 48-51, "It is envisioned that a user who uses the DIMS would initially copy the data image stored on storage device 110 onto RPSD 206 and then always select that image as the master data image.")*.

However, Kedem does not disclose:

- a local loopback driver retrieving partition and file system layout information from the source disk; and

- a formatting module comprising computer-executable instructions for formatting the destination image to have the same partitioning and file system as the simulated source disk and thus of the source disk.

Han discloses:

- a local loopback driver retrieving partition and file system layout information from the source disk *(see Column 4: 41-44, "A larger storage device, such as a hard disk or a file server, can be divided into many different volumes, or partitions, each of which can be formatted in a different manner.")*; and

- a formatting module comprising computer-executable instructions for formatting the destination image to have the same partitioning and file system as the simulated source disk and thus of the source disk *(see Column 4: 64-67, "This information is initially created when the volume is initialized, or formatted, and modified thereafter whenever the file management system writes information to the volume.")*.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Han into the teaching of Kedem to include a local loopback driver retrieving partition and file system layout information from the source disk; and a formatting module comprising computer-executable instructions for formatting the destination image to have the same partitioning and file system as the simulated source disk and thus of the source disk. The modification would be obvious because one of ordinary skill in the art would be motivated to create a disk image that has properties of the physical storage device *(see Han – Column 3: 30-34)*.

18. **Claims 9-11 and 14** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Kedem** in view of **Han** as applied to Claims 7 and 21 above, and further in view of **US 6,075,938 (hereinafter "Bugnion")**.

As per **Claim 9**, the rejection of **Claim 7** is incorporated; however, Kedem and Han do not disclose:

- in which the destination image is a virtual disk file associated with a virtual computer.

Bugnion discloses:

- in which the destination image is a virtual disk file associated with a virtual computer

(see Column 10: 5-7, "Disco virtualizes disks by providing a set of virtual disks that any virtual machine can mount.").

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Bugnion into the teaching of Kedem to

include in which the destination image is a virtual disk file associated with a virtual computer. The modification would be obvious because one of ordinary skill in the art would be motivated to support different sharing and persistency models *(see Bugnion – Column 10: 7-8)*.

As per **Claim 10**, the rejection of **Claim 9** is incorporated; and Kedem further discloses:

- in which the first computer is a physical computer and the source disk is a physical disk associated with the physical computer *(see Column 8: 6-7, "The DIMS is 110 a client/server system, and thus includes a client 202 and a server 204." and 10-12, "The DIMS also includes a persistent storage device (PSD) 206 that can be read from and written to by RDIM 204.")*.

As per **Claim 11**, the rejection of **Claim 9** is incorporated; however, Kedem and Han do not disclose:

- in which the virtual disk file is a sparse virtual disk, having a predetermined capacity and initial sector contents with null values.

Official Notice is taken that it is old and well-known within the computing art to utilize a sparse virtual disk. Applicant has submitted in the "Background of the Invention" section of the specification that a VMM may implement a virtual disk using a sparse, sector-based image format *(see Page 21, Paragraph [0094])*. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include in which the virtual disk file is a sparse virtual disk, having a predetermined capacity and initial sector contents with null values. The modification would be obvious because one of ordinary skill in the art would be motivated to keep the virtual disk files small *(see Page 21, Paragraph [0094])*.

As per **Claim 14**, the rejection of **Claim 7** is incorporated; however, Kedem and Han do not disclose:

- in which the source disk is a first virtual disk associated with a first virtual computer and the destination disk is a second virtual disk associated with a second virtual computer.

Bugnion discloses

- in which the source disk is a first virtual disk associated with a first virtual computer and the destination disk is a second virtual disk associated with a second virtual computer *(see Column 10: 5-7, "Disco virtualizes disks by providing a set of virtual disks that any virtual machine can mount.")*.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Bugnion into the teaching of Kedem to include in which the source disk is a first virtual disk associated with a first virtual computer and the destination disk is a second virtual disk associated with a second virtual computer. The modification would be obvious because one of ordinary skill in the art would be motivated to support different sharing and persistency models *(see Bugnion – Column 10: 7-8)*.

As per **Claim 24**, the rejection of **Claim 21** is incorporated; however, Kedem and Han do not disclose:

- in which the destination image is a virtual disk file associated with a virtual computer.

Bugnion discloses:

- in which the destination image is a virtual disk file associated with a virtual computer *(see Column 10: 5-7, "Disco virtualizes disks by providing a set of virtual disks that any virtual machine can mount.").*

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Bugnion into the teaching of Kedem to include in which the destination image is a virtual disk file associated with a virtual computer. The modification would be obvious because one of ordinary skill in the art would be motivated to support different sharing and persistency models *(see Bugnion – Column 10: 7-8).*

As per **Claim 25**, the rejection of **Claim 24** is incorporated; however, Kedem and Han do not disclose:

- in which the first computer is a physical computer and the source disk is a physical disk associated with the physical computer.

Bugnion discloses:

- in which the first computer is a physical computer and the source disk is a physical disk associated with the physical computer *(see Column 10: 5-7, "Disco virtualizes disks by providing a set of virtual disks that any virtual machine can mount.").*

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Bugnion into the teaching of Kedem to include in which the first computer is a physical computer and the source disk is a physical disk associated with the physical computer. The modification would be obvious because one of

ordinary skill in the art would be motivated to support different sharing and persistency models *(see Bugnion – Column 10: 7-8)*.

Response to Arguments

19. Applicant's arguments filed on January 3, 2008 have been fully considered, but they are not persuasive.

In the Remarks, Applicant argues:

a) Firstly, the LDIM 202 does not intercept I/O requests directed to a simulated source disk. As indicated by the quoted text of Kedem et al. in the Office action, LDIM 202 intercepts read/write requests directed to the storage device 110. This is opposite to the claimed invention in which the I/Os to the simulated disk are intercepted. Moreover, it is clear that Kedem et al. fail to suggest the claimed features, because Kedem et al. teach that all changes to the master data image are stored in a list on the LDIM 202 so that a comparison can be made between data being accessed in the storage device and the corresponding data on the master data image. (See. Col. 9, lines 11 to 27). Intercepting I/O access to the simulated disk, assuming *arguendo* that the master data image corresponds to the simulated disk, would not enable the LDIM 202 to determine that the most up to date version of the requested data was available on the storage device 110 to send to the requesting device. Without having a request for the storage device 110, there would be no address to compare with the list by which to determine the version status of the data to be sent. In addition, the claimed invention makes clear that data from the source disk is transmitted according to the intercepted I/O requests to the simulated disks and not due to a comparison as

required by Kedem et al. Therefore, based upon the foregoing Applicants contend that claim 3 is neither anticipated by Kedem et al.

Examiner's response:

a) Examiner disagrees. Applicant's arguments are not persuasive for at least the following reasons:

First, Kedem clearly discloses "intercepting sector-based I/O requests directed to the simulated source disk" *(see Column 3: 62-67 to Column 4: 1-3, "The purpose of the LDIM is to imitate the LPSD. That is, the LDIM, from the computer's perspective, appears exactly like the LPSD. More specifically, the LDIM functions to intercept and process requests that are intended to be received by the LPSD, which may not be in fact installed in the computer."; Column 9: 9-15, "... LDIM 202 functions to intercept requests (for example, read/write requests) that are intended to be received by storage device 110. After a master data image is selected, upon intercepting a read request, LDIM 202 is programmed to determine whether the cached data image or the selected master data image has the most up to date version of the requested data."; Column 13: 66 and 67 to Column 14: 1 and 2, "Another approach is to add the interception and implementation of the LDIM onto the physical persistent storage device 110. This functionality would be added before the device's controller (not shown) handles requests.")*. Note that the LDIM (simulated source disk), from the computer's perspective, appears exactly like the LPSD (source disk). The LDIM intercepts the read/write requests that are intended to be received by the LPSD. Thus, the read/write requests are directed to the LDIM instead because the LDIM imitates the LPSD. Furthermore, Kedem also discloses that the LPSD may not be installed in the

computer at all. Thus, in such a situation, the read/write requests have to be directed to the LDIM.

Second, Kedem also clearly discloses "retrieving source disk data from the source disk according to the intercepted sector-based I/O requests" *(see Column 9: 28-32, "If LDIM 202 determines that the cached data image has the most up to date version of the requested data, then LDIM 202 retrieves the requested data from storage device 110 and passes the data back to the component or device from which it received the request.")*. Thus, the LDIM retrieves the requested data from the LPSD and sends it back to the component or device which requested it.

Conclusion

20. The prior art made of record and not relied upon is considered pertinent to Applicant's disclosure.

21. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Qing Chen whose telephone number is 571-270-1071. The Examiner can normally be reached on Monday through Thursday from 7:30 AM to 4:00 PM. The Examiner can also be reached on alternate Fridays.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Wei Zhen, can be reached on 571-272-3708. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the TC 2100 Group receptionist whose telephone number is 571-272-2100.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/QC/
March 11, 2008
/Wei Zhen/

Supervisory Patent Examiner, Art Unit 2191